

**REMARKS**

Entry of the foregoing, reexamination and reconsideration of the subject application, as amended, pursuant to and consistent with 37 C.F.R. § 1.112, are respectfully requested in light of the remarks which follow.

**I. Claim Amendments**

By the foregoing amendments to the claims, claims 1, 3, and 9 have been amended and claims 2, 7 and 8 been cancelled.

In particular, claim 1 has been amended to specifically recite that the method comprises using DERA enzymes comprising SEQ ID NO: 2 (the polypeptide sequence of DERA from *T. maritima*) or SEQ ID NO: 4 (the polypeptide sequence of DERA from *P. aerophilum*). This amendment is supported throughout the specification as filed (*see esp.* the examples at pages 18-35 of the specification).

In addition, claim 9 has been rewritten in independent form, and has also been amended to recite a method comprising using DERA enzymes comprising SEQ ID NO: 2 or SEQ ID NO: 4.

The amendments to the claims, including cancellation of claims, have been made without prejudice or disclaimer to any subject matter recited or canceled herein. Applicants reserve the right to file one or more continuation and/or divisional applications directed to any canceled subject matter. No new matter has been added, and entry of the foregoing amendments to the above-identified application are respectfully requested.

**II. Response to Claim Rejections Under 35 U.S.C. § 112, First Paragraph**

Claims 2-5 and 8-11 have been rejected under 35 U.S.C. § 112, first paragraph, for purportedly lacking enablement.

Specifically, the Examiner has acknowledged that the specification enables a process for producing a hydroxyaldehyde using a DERA of SEQ ID NO: 1 or SEQ ID NO: 2. However, the Examiner has further stated that the specification does not enable a process for producing a hydroxyaldehyde using any and all mutants, variants, or fragments thereof.

To expedite prosecution in the present application, and not to acquiesce to the Examiner's rejection, the claims have been amended as described above. In particular, the claims have been amended to recite a process for producing a hydroxyaldehyde using DERA

comprising SEQ ID NO: 2 (DERA from *T. maritima*) or SEQ ID NO: 4 (DERA from *P. aerophilum*).

Applicants submit that the present specification fully enables the subject matter of the present claims. Accordingly, Applicants respectfully request reconsideration and withdrawal of the enablement rejection.

### **III. Response to Claim Rejections Under 35 U.S.C. § 112, Second Paragraph**

Claims 2-5 and 8-11 have been rejected under 35 U.S.C. § 112, second paragraph, as purportedly being indefinite for the following reasons:

**A.** The Examiner has noted that SEQ ID NO: 1 is a DNA rather than a polypeptide sequence.

In response, Applicants have amended the claims to correctly recite the DERA polypeptides as set forth in the Sequence Listing (*i.e.* SEQ ID NOS: 2 and 4).

**B.** The Examiner has stated that the compound of formula (7) is incorrectly identified as an aldehyde in claim 9.

In response, claim 9 has been amended such that the compound of formula (7) is no longer identified as an aldehyde.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the indefiniteness rejections.

### **IV. Response to Claim Rejections Under 35 U.S.C. § 103**

Claims 1-11 have been rejected under 35 U.S.C. § 103(a) as purportedly being unpatentable over Wong et al. (US 5,795,749). This rejection is respectfully traversed.

Wong et al. does not teach or suggest the subject matter of the present claims, for at least the following reasons.

As noted above, the DERA's of the present invention are from *T. maritima* or *P. aerophilum*. In contrast, the DERA disclosed in Wong et al. is from *E. coli*. The experiments set forth in the present application compare *T. maritima* and *P. aerophilum* DERA with *E. coli* DERA, and the results show that the present methods provide unexpected benefits. Specifically, as shown in Table 2 of the present specification, the resistance of *T. maritima* and *P. aerophilum* DERA to chloroacetaldehyde is advantageously higher than that of *E. coli* DERA. Furthermore, as shown in Examples 5-6 and Reference Example 2, the conversion

rate of chloroacetaldehyde (determined from the total amount of the products) is 95% for *T. maritima* DERA and 93% for *P. aerophilum* DERA. However, the conversion rate is only 4% for *E. coli* DERA. Thus, it is possible to obtain a high yield of desired hydroxyaldehyde compound using *T. maritima* DERA and *P. aerophilum* DERA, but not using *E. coli* DERA.

Additionally, a person of ordinary skill in the art would not have expected the use of the *T. maritima* and *P. aerophilum* DERA to provide such benefits. In particular, a thermophilic bacterium-derived enzyme generally exhibits high activity at high temperatures near the original growth temperature, but has significantly lower activity in the normal temperature range (20-30 °C). In the case of aldol condensation, where a highly reactive compound such as an aldehyde is used as the substrate, a reaction at high temperature is predicted to be accompanied by various side reactions. Thus, it is necessary to perform the aldol reaction under low temperature conditions, in which thermophilic bacterium-derived enzymes such as *T. maritima* and *P. aerophilum* DERAs would not be expected to be suitable for the reaction. Furthermore, a person of ordinary skill in the art would not have expected that the DERA enzymes of the present invention would have high stability against aldehydes, merely from the fact that the enzyme has high thermal stability, since aldehydes are known to be reactive to lysine and other amino acid residues that are present in proteins.

For at least these reasons, the present methods would not have been obvious to a person of ordinary skill in the art, and Applicants thus respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection.

**CONCLUSION**

From the foregoing, favorable action in the form of a Notice of Allowance is respectfully requested and such action is earnestly solicited.

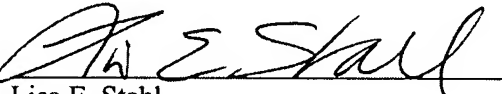
In the event that there are any questions related to this response, or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney at the below-listed telephone number concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

BUCHANAN INGERSOLL PC

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By:



Lisa E. Stahl

Registration No. 56,704

P.O. Box 1404  
Alexandria, Virginia 22313-1404  
(703) 836-6620